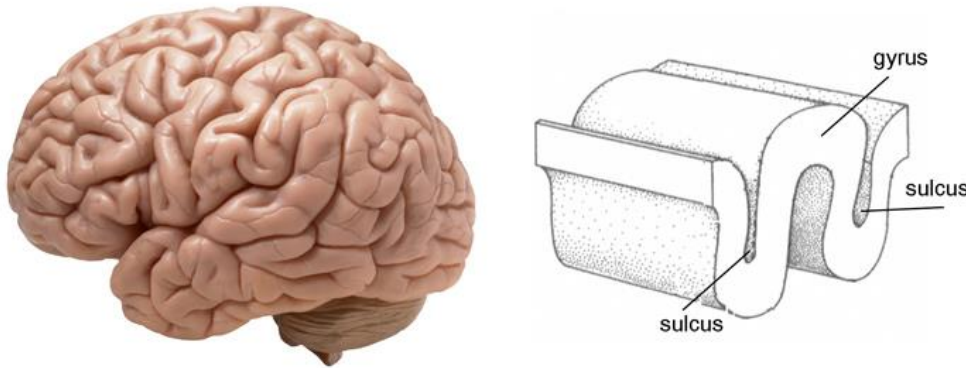


Lecture 1

Structure of the Cerebral Cortex

- The brain structure includes two hemispheres, **gyri**, and **sulci** (grooves)



- The **cerebral cortex** contains **projector pyramidal neurons** responsible for controlling the lower motor neuron pool
- **Grey matter** is found on the outside and consists of cell bodies
- **White matter** is located internally and consists of neuronal tracts (axons)
- The human cortex is divided into **52 Brodmann areas**
 - **Somatosensory cortex** = Areas 1, 2 and 3
 - **Angular gyrus** = Area 39; deep processing of language
 - **Wernicke's area** = Area 22; comprehension of language

Glial Cells

- The term **Glia** literally translates to "glue"
- Glial cells were initially discovered around the 1800s by Virchow, Schwann, and Remark
- Glial cells include **astrocytes** and **microglia**
 - **Astrocytes** are necessary for NT control and potassium (K) syphoning
 - Astrocytes also cause inhibition via gliotransmitter release and help maintain the **BBB**
 - **Microglia** have an immune function; they are the brain's resident macrophages
 - Microglia undertake synaptic pruning (getting rid of inactive synapses) to optimise neural efficiency
- The '**quadripartite synapse**' refers to the four 'components' of a synapse, which include the presynaptic terminal, postsynaptic terminal, microglia, and astrocytes

Early Understandings of the Brain

- **Ancient Egyptians** understood the nervous system in terms of the Nile River, where neural signals (life force) are delivered through the body's channels
- **Aristotle** believed the heart was the centre of intellect
 - Aristotle viewed the brain primarily as a cooling mechanism for the heart
- **Hippocrates** opposed Aristotle's view, as he believed that the intellect required the liver, brain, and heart together
- **Galen** was a Roman surgeon who dissected brains, often using gladiators
 - He concluded that the dense nature of the **cerebellum** meant it controlled muscle function
 - He assigned the **cerebrum** responsibility for the senses
 - Galen proposed that muscle function operated through "animal spirits"
- In the 1620s, **Rene Descartes** proposed that the **pineal gland** was the location where the mind and body interacted
 - Descartes located consciousness within the pineal gland

19th and 20th Century Understandings of the Brain

- In the 1850s, **Broca** established that different parts of the brain are specific to different functions, ie that brain functions can be localised to specific parts of the brain
 - Broca identified **Broca's area** through experiments with patients who had lesions in the left hemisphere
 - A famous patient, **Phineas Gage**, had his personality completely altered following damage to his left frontal lobe during a railway incident
 - In the 1890s, **Camillo Golgi** developed the silver stain technique
 - The Golgi stain revealed the intricate structure of single neurons
 - In the 1900s, **Ramon y Cajal** utilized the Golgi Stain
 - Cajal formulated the **Neuron Doctrine**
 - His work showed that neurons exist in a variety of "flavours" (many different types)
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